California Carbon Capture and Storage Review Panel

TECHNICAL ADVISORY COMMITTEE REPORT

Approaches to Pore Space Rights

AUGUST 10, 2010

CALIFORNIA CARBON CAPTURE AND STORAGE REVIEW PANEL

Jerry R. Fish
Stoel Rives LLP
Primary Author

Eric L. Martin
Stoel Rives LLP
Secondary Author

Other white papers for the panel will include

Monitoring, Verification, and Reporting Overview

Options for Permitting Carbon Capture and Sequestration Projects in California

Long-Term Stewardship and Long-Term Liability in the Sequestration of CO2

Enhanced Oil Recovery as Carbon Dioxide Sequestration

Carbon Dioxide Pipelines

Review of Saline Formation Storage Potential in California

Sequestration Risk History

Carbon sequestration cannot occur absent the right to inject and store carbon dioxide (CO_2) in subsurface pore spaces.[1] Three general approaches for addressing this issue have evolved over the past few years. This issue paper briefly describes these approaches and identifies positives and negatives of each. These positives and negatives are not listed in any particular order.

Complete Private Property Approach

This approach recognizes that the right to use the pore space for the injection and sequestration of CO_2 is a property right that must be obtained.[2] If there is a single property owner, that owner owns the right to use the subsurface pore space, but if the mineral rights have been severed, then the owner of the mineral estate has the dominant right to use pore space as necessary to produce valuable minerals.[3] Consequently, the surface estate owner's use of pore space cannot interfere with the mineral estate, and injecting gases into unacquired pore space could constitute a trespass against both the surface and the mineral estate.[4]

Because it can be difficult to establish that a mineral estate has been exhausted (*i.e.*, there are no more minerals that can be produced), under this approach a carbon sequestration project may need to obtain rights to use the pore space from the owners of both the surface estate and the mineral estate. This could be accomplished in a few different ways. First, a carbon sequestration project could obtain the necessary rights by means of negotiated agreements with the property owners, including any lessees of the mineral estate and any royalty owners. Second, if it had the power of eminent domain, a carbon sequestration project could condemn the rights. Third, if the requisite statutory authority existed, the state could unitize the rights within the targeted geologic structure.

a) Positives:

i) Consistent with public perception of property rights. The principle that ownership of property includes the right to control the use of that property is a fundamental concept in this country. Because this approach builds off this fundamental concept by requiring that the right to inject

---

[1] *See generally* Jerry R. Fish and Thomas R. Wood, *Geologic Carbon Sequestration: Property Rights and Regulation*, 54 ROCKY MT. MIN. L. INST. 3-1 (2008).

[2] *See* CAL. CIV. CODE § 829 ("The owner of land in fee has the right to the surface and to everything permanently situated beneath or above it.").

[3] The terms "surface estate" and "mineral estate" are commonly used in the context of severed property rights. However, these terms are misnomers, because the owner of the "surface estate" owns everything, including rights to use the subsurface, except for and subservient to the right to produce valuable minerals. In addition, the owner of the "mineral estate" has certain rights to use the surface in connection with the production of valuable minerals.

[4] *See Cassinos v. Union Oil Co.*, 18 Cal. Rptr. 2d 574 (Cal. App. 1993). Trespass could also result if injected gas causes brine to migrate into the pore space of another property that did not previously contain brine. For example, if displaced brine interfered with oil or gas production or fresh water aquifers, a cause of action for trespass could exist under *Cassinos*. *See also* footnote 6 below and accompanying text.

and sequester CO_2 underground be obtained from property owners, this approach does not require charting a new path for property rights. This makes acceptance and implementation less controversial.

ii) **Payment to property owners may lessen opposition to carbon sequestration and may help encourage development.** Development of the subsurface has economic benefits, such as revenues from produced oil or rent from stored natural gas. Property owners understand and expect that they will be compensated when someone else wants to use their land. This has been common practice throughout California's history (*e.g.*, from the mid-nineteenth century gold rush and the early twentieth century oil and gas boom to today's oil and gas production, natural gas storage, and wind farms). Because obtaining the requisite property rights—whether that be through negotiated agreements, unitization, or condemnation—will result in dollars in property owners' pockets, property owners may be more inclined to support this approach to carbon sequestration. Further, to the extent that such compensation is tied to actual sequestration (*e.g.*, an amount per ton of injected CO_2) rather than a one-time lump sum, a constituency of property owners will form that will want to see carbon sequestration happen.

iii) **IOGCC Model Statute.** Oil and gas regulators from across the country have recommended that carbon sequestration by treated like natural gas storage, and several states, such as Wyoming, Montana, and North Dakota, have enacted legislation following this recommendation. The legislatures in such states have directed that pore space belongs to the surface estate and provided mechanisms to unitize pore space within geologic structures. Consequently, property owners will be compensated for carbon sequestration that may occur beneath their property. In light of this, California property owners would likely be hostile to an alternative approach under which they may not receive any compensation.

iv) **Consistent with developing market for sequestration property rights.** Money is already being expended to acquire the right to inject and sequester CO_2 in pore space in other states, just as has been done for natural gas storage in California. This developing market relies on the traditional conception of property rights (*i.e.*, that property cannot be used without acquiring the right to do so from the property owner). Changing the law mid-stream would frustrate these earlier investments in carbon sequestration rights and delay the implementation of actual carbon sequestration projects by these early movers.

v) **Ability to deal with holdouts through unitization.** The risk of holdouts is present whenever large parcels of land with fragmented ownership must be assembled for a development project. For public projects, this problem is often addressed by the government's power of eminent

domain. Secondary recovery, which typically involves injecting water to produce otherwise unrecoverable oil and gas, implicates this same risk of holdouts, because it almost always requires coordinating activities across properties owned by different parties. Many states have addressed this problem by creating a statutory process through which multiple properties can be brought together and operated as a single unit.[5] Through such statutory unitization processes, a state agency allocates production to the various property owners within the unit on an equitable basis. If property owners elect not to participate, they cannot claim that the subsurface waterflooding constitutes a trespass.[6]

Wyoming, Montana, and North Dakota have addressed the risk of holdouts by applying the unitization concept to carbon sequestration. For example, under SB 498 in Montana, once a carbon sequestration project controls subsurface storage rights to 60% of the storage capacity in a proposed storage area, it can apply to unitize the storage area.

Unitization also has advantages over condemnation. The fair market value of condemned property is determined by what is taken rather than what is created.[7] Thus, property owners do not share in the upside of the project. In contrast, holders of unitized oil and gas leases continue to share in the upside. Similarly, carbon sequestration proceeds could be allocated to the owners of the storage rights within a unitized storage area, such that they have a stake in the financial upside of the project but are not liable for damages. This could make them more amenable to such a process, especially in light of the fact that their individual subsurface storage rights may be worth little in a condemnation proceeding.

---

[5] Statutory or compulsory unitization is distinct from contractual or voluntary unitization, which relies upon unitization clauses that are often found within oil and gas leases. California's limited compulsory unitization statute is found at CAL. PUB. RES. CODE §§ 3630 *et seq.* Contractual unitization requires that the various leases contain compatible unitization clauses. Furthermore, contractual unitization only works if all of the lessees are willing to unitize; if not, contractual unitization is ineffective.

[6] *See, e.g.*, *Baumgartner v. Gulf Oil Corp.*, 168 N.W.2d 510, 516 (Neb 1969) (holding that "where a secondary recovery project has been authorized by the [Nebraska Oil and Gas Conservation C]ommission the operator is not liable for willful trespass to owners who refused to join the project when the injected recovery substance moves across lease lines," because public policy seeks to avoid the waste of natural resources that would occur absent secondary recovery). As such, unitization could be useful for addressing issues related to brine displacement in saline formations as well. *See* footnote 4 above. *See also Alameda County Water District v. Niles Sand & Gravel Co.*, 112 Cal. Rptr. 846 (Cal. Ct. App. 1974) (holding that interference with gravel mining caused by migration of fresh water injected underground through a state-authorized aquifer storage and recovery project was not compensable).

[7] *See Pacific Gas & Elec. Co. v. Zuckerman*, 234 Cal. Rptr. 630, 637 (Cal. Ct. App. 1987).

b) Negatives:

i) **Transaction costs.** Obtaining property rights from private property owners, whether it be through negotiated agreements, unitization, or condemnation, will undoubtedly result in transaction costs, especially for commercial scale sequestration projects, which may require 100 to 200 square miles of pore space rights.[8] To the extent that geologic structures suitable for carbon sequestration are owned by multiple parties, which is almost certainly the case given the large size of these structures, transaction costs will increase. This inefficiency that could impede the implementation of carbon sequestration, especially in situations where ownership is highly fragmented, if unitization is not an option. However, because developers are currently acquiring sequestration rights in some states, notwithstanding fragmented ownership, the inefficiencies may not be significant.

ii) **Potential for holdouts.** Building upon the transaction costs associated with negotiated agreements, unless there is a way to address the risk of holdouts, the actual development of carbon sequestration project could be delayed or be more capital intensive. Unitization and eminent domain could both serve as mechanisms to deal with this risk, but both create additional problems. For example, the time saved by not having to buy out holdouts through a negotiated agreement could be consumed by litigation related to the unitization or condemnation. Further, unless these mechanisms allow carbon sequestration projects to use pore space pending an allocation/compensation decision (*e.g.*, a quick take provision), the timeline for actual implementation could still be quite long.[9]

iii) **Increased operating costs.** The need to compensate property owners for the use of pore space will increase the operational cost structure for carbon sequestration projects. This could mean that some percentage of potential carbon sequestration projects will not be economically viable. But the same could be said of wind or solar projects (*i.e.*, if access to land were free more projected would be viable).

iv) **Continued uncertainty regarding ownership of pore space.** Ownership of pore space is not typically set out in the deeds that split property into

---

[8] An optimal site for carbon sequestration would have a geologic structure that limits lateral expansion of the CO_2 plume and has multiple injection zones, which would decrease the size of the area for which pore space property rights are needed.

[9] Under CAL. CODE CIV. PRO. § 1255.410, a "quick take" in California requires at least 60 days, and if opposed the condemnor must demonstrate that "there is an overriding need" to possess the property now, "a substantial hardship" will occur if the quick take is denied, and that substantial hardship outweighs any hardship on the condemnee.

surface and mineral estates. Consequently, there is often uncertainty as to who has the right to use the pore spaces absent the presence of oil or gas. Those states that have addressed the pore space property right issue have created interpretive presumptions prior conveyances of property. For example, there is a rebuttable presumption under Wyoming's HB 89 that pore space is owned by the surface owner. This presumption, however, is not conclusive, which means that courts may still need to determine who owns the pore space for a particular property. Obtaining such determinations could delay the implementation of carbon sequestration projects.

c) **Legislation Needed:** This approach would require legislation that allocates ownership of pore space, defines ownership of injected CO_2, and allows for unitization and/or eminent domain to acquire pore space, including pore space owned by state and local governments.

Limited Private Property Approach

This approach tweaks the traditional concept of underground property rights from the oil and gas context. Instead of an absolute right to pore space, this approach is based on the idea that subsurface property rights are "contingent upon interference with reasonable and foreseeable use" of the property.[10] Consequently, so long as the sequestration of CO_2 would not interfere with such uses, a carbon sequestration project would not need to obtain the right to use pore space from property owners.

This approach is most prominently reflected in the CCS Reg Project's recently published model legislation. Under this model legislation, a carbon sequestration project could apply for a "pore space permit," which would convey the exclusive privilege to access and use identified pore space for carbon sequestration. Prior to issuing a pore space permit, the state environmental protection agency would conduct a proceeding in which holders of a "non-speculative economic interest" (*i.e.*, the ability to economically recover actual mineral resources or engage in other current or imminent subsurface activities that have substantial economic value) could participate. Anyone that did not participate in this proceeding would waive any and all subsurface property rights that might be affected by the proposed carbon sequestration project. If the injection and sequestration of CO_2 would cause actual and substantial damages to such an interest, then either (i) the project would be modified to avoid the damages, (ii) the carbon sequestration project would have to negotiate an agreement with the holder of the interest, or (iii) the state environmental protection agency could authorize condemnation of the interest.

In summary, under this approach, unless a landowner could show current or imminent mineral or other subsurface activities with substantial economic value, the landowner would have no subsurface property rights and a carbon sequestration project could proceed simply by

[10] *Chance v. BP Chemicals, Inc.*, 670 N.E.2d 985, 993 (Ohio 1996) (holding that migrating hazardous waste did not constitute a trespass).

obtaining a pore space permit.[11] If such subsurface property rights were demonstrated to exist, then the carbon sequestration project would address these rights through means similar to those described under the Complete Private Property Approach (*e.g.*, negotiated agreements or condemnation).

a) Positives:

i) **Pore space permit not required.** Under the CCS Reg Project's model legislation, there is no requirement that a pore space permit be obtained. Consequently, developers who have already acquired carbon sequestration property rights would not be required to utilize this process.

ii) **Property rights adjudicated once and for all in a unified process.** By addressing property rights in an adjudicative proceeding prior to injection, carbon sequestration projects would have greater certainty regarding risk of legal liability. Further, by utilizing a unified process, carbon sequestration projects would avoid piecemeal litigation.

iii) **Application to saline formations.** Most property owners probably would not have current or imminent subsurface activities of substantial economic value in geological structures containing only saline formations. Because this approach eliminates private pore space property rights for this category of property owners, this approach could be advantageous for encouraging carbon sequestration in saline formations.

b) Negatives:

i) **Inconsistent with public perception of property rights.** Because this approach would be perceived as taking the pore space rights of many property owners (*e.g.*, those without current or imminent subsurface activities that have substantial economic value), enacting this approach may encounter strong public opposition. This inconsistency with the public perception of property rights may also prompt litigation that could delay implementation of projects utilizing this process.

ii) **Perceived lack of fairness.** One of the sticks in property owners' bundle of rights is the right to explore for valuable minerals. However, under this approach, owners whose property had not been explored, and thus did not have a non-speculative economic interest, would "waive" their pore space rights. This could readily be perceived as unfair, especially (1) as landowners often have neither the financial wherewithal nor the

[11] The Kentucky legislature considered a bill with a similar approach this year. HB 491 would have declared geologic strata beneath 5,500 feet that does not contain either "recoverable or marketable" minerals or water that can be used for a beneficial purpose to be property of the state.

technical expertise themselves to explore for valuable minerals, (2) if other properties had been explored and valuable minerals had been found, and (3) in light of technological advances that make previously unrecoverable minerals recoverable (*e.g.*, horizontal drilling and fracturing now allow recovery from gas shales). Such property owners may view this as a process to avoid paying for their property rights and oppose its implementation.

iii) **Inconsistent with developing market for sequestration property rights.** It is unclear whether already obtained carbon sequestration property rights would be considered a non-speculative economic interest in the adjudicatory process. If not, existing sequestration easements and leases obtained by early movers could be worthless, which could delay actual implementation of sequestration projects and anger those property owners that thought they would be receiving remuneration for granting carbon sequestration rights.

iv) **Expertise of adjudicatory entity.** Subsurface property rights can be very complex. The adjudicatory entity would require not only the expertise to resolve these issues, but also the reputational wherewithal to support the legitimacy of its decisions in the public's eye. It may well be difficult for a state environmental protection agency, as under the CCS Reg's model legislation, to build such expertise for subsurface property right adjudications.

v) **Application to mineral rights.** Although surface owners may very well have no realistic expectation to use geological structures suitable for carbon sequestration, mineral estate owners undeniably have an expectation that they may explore the subsurface. The Limited Private Property Approach, however, only recognizes that right if there is the ability to economically recover actual mineral resources in the very near future. This creates a number of problems. First, the scope of what economically recoverable mineral resources changes with the price of the resource. More oil is economically recoverable when the price is at $80/barrel than at $40/barrel. Consequently, mineral rights would morph into a property right, the existence of which depends upon market conditions at a particular point in time. Second, knowledge regarding the existence of mineral resources is limited. A mineral estate owner may know that valuable minerals exist beneath a property but does not yet know whether they are economically recoverable. Similarly, an area's geology may suggest that valuable minerals exist underneath the surface, but until the subsurface is explored, no one knows whether that is really true. Third, as described above, what is recoverable can change in the future due to technological advances. Consequently, mineral owners' rights may be eliminated under this approach because the property has not yet been explored or the minerals are not economically recoverable

under current market conditions or with current technology.[12] Mineral owners would almost certainly oppose this approach for these reasons.

In addition, this approach does not apply neatly to carbon sequestration that might occur in depleted oil and gas reservoirs. The mineral estate owners in that situation may still have non-speculative economic interests (*e.g.*, secondary recovery could be used to produce additional oil). Consequently, the carbon sequestration project would have to utilize the same Complete Private Property Approach's tools (*e.g.*, negotiated agreements and condemnation). This approach then may not do anything to substantially advance implementation of projects in these reservoirs, which may be the low-hanging fruit for carbon sequestration.

c) **Legislation Needed:** This approach would require legislation that establishes the process by which property rights are adjudicated, defines a "fair" threshold at which a property right to pore space is recognized (*e.g.*, "non-speculative economic interest" in the CCS Reg's model legislation), and allows for eminent domain of recognized pore space rights, including pore space containing minerals and pore space owned by state and local governments.

Public Resource Approach

Case law suggests that aquifer storage and recovery ("ASR") law could serve as a third approach at least for carbon sequestration in saline formations. In *Alameda County Water District v. Niles Sand & Gravel Co.* a gravel operator alleged that the flooding of his gravel pits that resulted from an ASR program constituted a taking because it interfered with subsurface rights and the business operations.[13] Recognizing that the regulation of the state's water resources was a constitutional exercise of the state's police power, the California Court of Appeals held that the water district's activities were a legitimate exercise of the police power and that the adverse effect on the gravel operator's use of its property was not compensable.[14] This line of reasoning is somewhat analogous to the rationale of preventing the waste of natural resources that underlies trespass cases involving secondary recovery in oil and gas fields.[15] To the extent that California under its police power can use saline formations and the geologic structures in

---

[12] It is also unclear what would happen if valuable minerals were discovered in the course of the sequestration project. Would these be the property of the state? The carbon sequestration project? The prior mineral estate owner?

[13] 112 Cal. Rptr. 846 (Cal. Ct. App. 1974).

[14] *Id.* at 855. *See also Board of County Commissioners v. Park County Sportsmen's Ranch, LLP*, 45 P.3d 693, 707 (Colo. 2002) ("[B]y reason of Colorado's constitution, statutes, and case precedent, neither surface water, nor ground water, nor the use rights thereto, *nor the water-bearing capacity of natural formations belong to a landowner* as a stick in the property rights bundle.") (emphasis added)).

[15] *See, e.g., Railroad Com. of Texas v. Manziel*, 361 S.W.2d 560 (Tex. 1962) (holding that migrating water from secondary recovery operations authorized by Railroad Commission order in non-unitized field did not constitute a trespass on adjacent mineral estate because this would discourage secondary recovery). *See also* footnote 6 above.

which they occur for public purposes, legislation potentially could be enacted that authorizes the use of saline formations for carbon sequestration without infringing upon private subsurface property rights.

a) Positives:

i) Does not require acquisition of pore space rights. Acquiring pore space rights, whether it be under the Complete Private Property Approach or the Limited Private Property Approach will take both time and money. In contrast, the Public Resource Approach eliminates the need to spend time and money acquiring pore space rights.

b) Negatives:

i) Uncertainty regarding utilizing police power to effect carbon sequestration in saline formations. Western states, including California, have long recognized the value of fresh water and the need to protect it. This recognition underlies ASR jurisprudence. Similarly, there is plenty of legal support for statutory unitization and governmental authorization of secondary recovery operations in order to prevent the waste of oil and gas. In contrast, carbon sequestration is a new concept. Consequently, regardless of how laudable promoting carbon sequestration may be from a public policy perspective, there would be unavoidable legal uncertainty regarding the state's use of saline formations for carbon sequestration. The courts would have to resolve this issue, which could delay implementation of carbon sequestration projects.

ii) Application limited to saline formations. Although saline formations may have the largest carbon sequestration capacity, some see depleted oil and gas reservoirs as the low-hanging fruit. However, this approach is not applicable to such reservoirs, because injecting CO2 would allow for the recovery of previously unrecoverable minerals. By being limited to saline formation, this approach may not help spur early carbon sequestration projects.

iii) Could require creation of public sequestration entity. Reliance on the state's police power may necessitate that a public entity do the sequestration, just as a water district was conducting the ASR operation in *Alameda County Water District*.[16] One must consider how quickly a public entity could actually implement a carbon sequestration project in an era of uncertain public finances. Further, the potential for liability will accompany any public entity that is actually conducting injection and sequestration operations.

[16] However, courts have upheld private entities' use of unappropriated pore space in the oil and gas context when that use is authorized by a public entity. *See, e.g.*, *Railroad Com. of Texas v. Manziel*, 361 S.W.2d 560 (Tex. 1962).

iv) **Eliminates private sequestration rights in saline formations.** This approach, like the Limited Private Property Approach, could be perceived as taking the pore space rights of many property owners and could encounter public opposition for this reason. Further, this approach could wipe out investments that private parties may have made in obtaining sequestration rights in saline formations, which could delay implementation of carbon sequestration projects.

c) **Legislation Needed:** This approach would require legislation that recognizes saline formations as public resources and authorizes a public agency to either conduct sequestration operations or permit private entities to conduct sequestration operations on the public's behalf.